



QUICK REACTION LAUNCH VEHICLE 1

TRANSPORTATION PLAN

January 2001

QUICK REACTION LAUNCH VEHICLE (QRLV- 1) MISSION TRANSPORTATION PLAN

Prepared For:

SMC/TEB

By:

**Space and Missile Systems Division
Systems Engineering & Technology Operations**

Authored By

William W. Hughes

QRLV Program

January 2001

Table of Contents

1.0	INTRODUCTION	1-1
1.1	Purpose	1-1
1.2	Scope.....	1-1
1.3	Responsibilities	1-1
1.3.1	M-56 A-1 Motor.....	1-1
1.3.2	Payload.....	1-1
1.3.3	General	1-1
1.4	References	1-1
2.0	SHIPPING AND HANDLING REQUIREMENTS.....	2-1
2.1	M-56 A1 Motor Configuration.....	2-1
2.1.1	Payload (TBD)	2-1
2.2	Pathfinder.....	2-1
2.3	Launch Stool	2-1
2.4	M-56 A1 Motor in Transit Environmental Control.....	2-1
2.5	Flight Termination System (FTS)	2-1
2.6	Government Bill of Lading (GBL) Preparation	2-2
2.7	Quantity Distance (QD) Siting.....	2-2
2.8	Transit Requirements.....	2-2
2.8.1	Transit Storage	2-2
2.8.2	Transit Security Live Motor.....	2-2
2.9	Emergency Response.....	2-2
2.10	Environmental Assessment (EA).....	2-3
2.11	Air Transport Requirements	2-3
2.11.1	Delivery of M-56 A1 Motor	2-3
2.11.2	Hill AFB Air Operations	2-4
2.11.3	463L Pallet Handling.....	2-4
2.11.4	Inclement Weather	2-4
2.11.5	Flight Path and Notification	2-4
2.11.6	Preparation Activities.....	2-5
2.11.7	Kodiak Airport	2-7
2.11.8	Airport Restrictions.....	2-9
2.11.9	Spacemark, Inc.	2-10
2.11.10	Aircraft Refueling.....	2-10
2.11.11	Small Quantity Explosive Storage.....	2-11
2.11.12	Meteorology	2-11
2.11.13	Kodiak Climatology	2-11
2.12	Road Transport Requirements	2-12
2.12.1	Vehicle Attributes.....	2-12
2.12.2	Road Vehicle Operations.....	2-12
2.12.3	Maximum Speed	2-12
2.12.4	Pilot Vehicles.....	2-12
2.12.5	Kodiak to AADC Launch Site	2-13
2.13	Water Transport Requirements.....	2-17

2.13.1	Loading and Unloading	2-17
2.13.2	Natural Environments	2-20
2.13.3	Sea Voyage	2-20
2.13.4	Off-Load.....	2-21
2.13.5	Alternate Handling.....	2-22
3.0	GROUND SUPPORT EQUIPMENT (GSE)	3-1
3.1	QRLV Erector.....	3-1
3.2	M-56 A-1 Motor Carriage.....	3-2
3.2.1	Carriage Properties	3-2
3.3	Rail Set and Properties	3-2
3.4	Figure A-101, Rocket Motor Semi-Trailer	3-3
3.5	Figure A-101 Tractor	3-4
4.0	CONTINGENCIES	4-1
4.1	Flight Operations	4-1
4.2	EOD Response.....	4-2
4.3	Turnoffs	4-2
4.4	February Delivery, Campaign	4-2
5.0	QRLV SHIPPING LIST (TBD).....	5-1
6.0	LOGISTICS SUPPORT	6-1
6.1	Spares	6-1
6.2	Support Equipment (TBD).....	6-1
6.3	Personnel Requirements.....	6-1
7.0	APPROVALS AND CERTIFICATES.....	7-1
8.0	ENVIRONMENTAL COMPLIANCE	8-1
9.0	ABBREVIATIONS AND ACRONYMS.....	9-1
10.0	ATTACHMENTS.....	10-1

Table of Figures

Figure 2.11.1-1	C-5 Clearance Envelope	2-4
Figure 2.11.5-1	Typical Flight Path, Hill AFB to Kodiak Airport	2-5
Figure 2.11.7-1	Kodiak Airport.....	2-8
Figure 2.11.7-2	Aircraft Off-load Area Kodiak Airport.....	2-9
Figure 2.11.8-1	ait Download Operation on Taxiway Echo	2-10
Figure 2.12.4-1	Typical Delivery Convoy	2-13
Figure 2.12.5-1	Kodiak Area Map.....	2-14
Figure 2.12.5-2	Kodiak Launch Complex - Site Map.....	2-15
Figure 2.12.5-3	Typical Upgraded Bridge Structure along Chiniak & Pasagshak Roads.....	2-15
Figure 2.12.5-4	Tight, Sloping Switchback at Mile 19.1	2-15
Figure 2.12.5-5	8% Grade Down to Kalsin Bay at MP 22. 2.....	2-16
Figure 2.12.5-6	Tight Area, Narrow Curve, Pasagshak Bay Drop-off at Mile 34.4.....	2-16
Figure 2.13.1-1	Barge Ramp #1, Banana Style	2-18
Figure 2.13.1-2	259 Ton Straight Ramp #2 in Seattle	2-18
Figure 2.13.1-3	Typical Barge Bound for Kodiak.....	2-19
Figure 2.13.1-4	Deck Tie Down Arrangement for Securing Cargo to Barge	2-19
Figure 2.13.3-1	QRLV Sea Shipment Route.....	2-21
Figure 2.13.4-1	Banana Ramp at Lash Wharf Kodiak	2-22
Figure 2.13.4-2	Forklift with 30” Ground Clearance Approaching Ramp Crest.....	2-22
Figure 3.1-1	QRLV Erector Elevating the ait-2 Booster and Payload	3-1
Figure 3.1-2	ait-2 Booster and Payload on the Erector in the Integrated Process Facility (IPF) ...	3-2
Figure 3.3-1	ait Booster Being Transferred from the Rail Set to the Erector.....	3-3
Figure 3.4-1	M-56 A-1 Arrangement within Semi-Trailer	3-4
Figure 3.5-1	Left and Right Profiles of a Figure A-101 Semi-Trailer.....	3-4
Figure 3.5-2	Figure A-101 Tractor & Semi-Trailer in Combination.....	3-5
Figure 4.1-1	Final Approach to Runway 7-25	4-1

List of Tables

Table 2.1-1	MM M-56 A1 Attributes	2-1
Table 2.1.1-1	Payload Attributes.....	2-1
Table 2.7-1	Quantity Distance (QD) for Motor	2-2
Table 2.11.13-1	Kodiak Climatology.....	2-11
Table 2.12.1-1	State Envelope and Axle Load Limits for Road Transport	2-12
Table 2.13.1-1	Samson Tug and Barge Schedule 2000	2-17
Table 3.5-1	Axle Loads Figure A-101 and Tractor, Loaded with an M-56.....	3-5

1.0 INTRODUCTION

1.1 Purpose

This document describes the applicable requirements for shipment of a Quick Reaction Launch Vehicle (QRLV) assembled M-56 A-1 Minuteman (MM) Motor, flight associated hardware, and Ground Support Equipment (GSE) from Hill Air Force Base (HAFB), UT, to the Alaska Aerospace Development Corporation (AADC). AADC operates the Kodiak Launch Complex (KLC) located at Narrow Cape, Kodiak, Alaska. KLC, under contract with the SMC/TEB office, will provide the launch site facilities. Orbital Sciences Corp. will perform as the prime program integrator and test conductor.

1.2 Scope

This document addresses the peculiar aspects of shipping and handling an assembled motor, hardware and related GSE, using air, road, and water modes of transportation. It addresses the requirements for shipping timelines and identifies various state, federal, and regulatory requirements associated with the shipment of rocket motors. The QRLV program uses a campaign approach whereby all hardware required for the mission is shipped to KLC and all hardware is returned after the launch is completed. There are four distinct phases of shipping to/from AADC: pre-positioning, pathfinder, launch campaign and post-positioning. Pre-positioning includes all GSE that can be shipped early due to availability, weight or envelope, or is required to be in place to support other hardware deliveries. Pathfinder activities will verify the QRLV is compatible with AADC facility electrical interfaces. Pathfinder mechanical interfaces will be conducted at White Sands Missile Range, NM. The launch campaign is the actual launch event, which includes shipment of the launch vehicle and associated GSE. The post-position activity will return all hardware back to Orbital Sciences Corp., or to the applicable government agencies from which it was borrowed.

1.3 Responsibilities

1.3.1 M-56 A-1 Motor

Air Force (AF) SMC/TEB office located at Kirkland Air Force Base, NM is the single management focal point for all AF asset shipments from HAFB to the launch site and the assembly, checkout and integration of the motor and associated payload at the launch site.

1.3.2 Payload

Payload shipment to the Air Terminal load planning and build-up area (HAFB) will be the responsibility of Orbital Sciences Corp.

1.3.3 General

As the design and configuration evolves, it is the team's responsibility early on to identify those items that will be offered for transport. Accuracy is paramount when identifying the shipping envelope and weight, as this information will be used for palletizing, aircraft load planning, and Special Assignment Airlift Mission (SAAM) validation. Previous missions have encountered inaccuracies which have led to the "Boat in the Basement" demise.

1.4 References

The following documents are referred to and are applicable as described in this document:

Air Transport

MIL-HDBK-1791	Designing for Internal Aerial Delivery in Fixed Wing Aircraft
AFJM 24-204	Preparing Hazardous Materials for Military Air Shipments

Road & Sea Transport

MIL-STD-1366D Interface Standard for Transportability Criteria
MIL-STD-1784 Mobility Towed and Manually Propelled Support Equipment

CFR Title 49 Code of Federal Regulations (CFR) Transportation

Part 100 Transportation and Packaging
Part - 390 Federal Motor Carrier Safety Regulations, General
Vehicle Sizes and Weights Manual, J. J. Keller Associates

Environmental

AFI 32-7061
Council on Environmental Quality Code of Federal Regulations (CFR) 1500
DODD 5000.1 Defense Acquisition

Miscellaneous

MIL-STD-1472E Human Engineering - Design Criteria Standard
T.O. 21M-LGM30F-2-2-1 Missile Handling and Transportation
T.O. 36A9-11-3-31 Rocket Motor Semi-trailer
Recovery Guide for LGM-30 Transportation and Missile Handling Equipment, April 94

2.0 SHIPPING AND HANDLING REQUIREMENTS

2.1 M-56 A1 Motor Configuration

	<i>Length (in.)</i>	<i>Diameter (in.)</i>	<i>Propellant Weight (lb.)</i>	<i>Propellant Class</i>	<i>Motor Weight (lb.)</i>
	156	44.5	10,380	1.3	12,072

Table 2.1-1 MM M-56 A1 Attributes

2.1.1 Payload Classified Secret

<i>Weight (lb.)</i>	<i>Length (in.)</i>

Table 2.1.1-1 Payload Attributes

2.2 Pathfinder

The pathfinder is required to checkout both the mechanical interfaces between Orbital's flight hardware, GSE, and electrical interfaces at White Sands Missile Range and KLC. The mechanical portion will be conducted at White Sands in the third quarter of FY 00 and the electrical check at KLC approximately 90 days prior to launch. The pathfinder motor is a mechanical and electrical replica of the flight vehicle and also duplicates mass weight. There is also a requirement for the QRLV/Erector, GSE, rail set, lifting device and launch stool to be available for the test. In addition, the pathfinder will ferret out any anomalies and oversights associated with transportation planning.

2.3 Launch Stool

The launch stool with flame deflector was originally shipped in an assembled configuration. It has supported the **ait** project, and more recently the ait-2 launch program. This component was arranged and secured on top of the Erector vehicle at the forward end. Return shipment could utilize a 20' International Standards Organization (ISO) container and be shipped by barge or secured on a 463L pallet for return by air, if chosen. The launch stool is 6'-8" diameter x 5'-9" high and sits on a 6'-10" square base; weight is 3,500 pounds.

2.4 M-56 A1 Motor in Transit Environmental Control

Temperature curves and extremes for motor segments during transit are as specified in T.O. 21M-LGM30F-2-2-1.

2.5 Flight Termination System (FTS)

FTS could be installed on the assembled motor at HAFB prior to shipment to the launch site. They may also be shipped separately and installed during the processing phase at the KLC. The FTS enables destruction of the motor if it deviates from its projected flight path. Composition of the system is a harness arrangement of detonators and shape charges, some of which contain Class/Division (C/D) 1.1 components. When C/D 1.1 components are assembled with C/D 1.3 components, the explosive safety rules (DOD 6055.9 STD) require that the assembled unit retain the highest (or most hazardous) assigned explosive C/D (1.1).

2.6 Government Bill of Lading (GBL) Preparation

The using command or government contractor shall complete the GBL preparation. The GBLs shall annotate KLC as the final destination and HAFB as the interim waypoint. This will apply to all equipment destined for Kodiak. If HAFB is shown as the destination, this will be cause to generate an additional GBL for the completion of the delivery. The ship to, mark for, HAFB address is: 75th ABW/LGT, 7520 Warleigh Rd. Bldg. 900, Hill AFB, UT 84056-5707, Attn: Jim Adams, Phone No. 801-777-3088. They can store limited amounts of 1.4 Haz-Mat in a secure cage in Bldg. 900. Haz-Mat items having a class/division of 1.3 through 1.1 must ship to FB 2172, 649 Muns MAD, Bldg. 1377, Hill AFB, UT 84056-5707. The ship to, mark for, KLC address is: Kodiak Launch Complex, Pasagshak Road, Kodiak, AK 99615, Attn: John Pfiefer, Phone No. 907-273-1580 (KLC site) or 907-486-8886 (in-town Kodiak office).

2.7 Quantity Distance (QD) Siting

Launch sites and all support and storage facilities are required to be sited in accordance with (IAW) OSHA Safety Standards.

Minimum inhabited building (IB) QD requirements for the MM stage configuration is as follows:

<i>ITEM</i>	<i>Explosive Class/Division</i>	<i>QD without AODS (ft.)</i>	<i>QD with AODS (ft.)</i>
MM M-56 A1	1.3	150	150

*The All Ordnance Destruct System (AODS) is normally configured as a harness and not installed separately on the stage.

Table 2.7-1 Quantity Distance (QD) for Motor

2.8 Transit Requirements

2.8.1 Transit Storage

Transit storage of a motor shall not be required. The motor shall not be parked at any point during transit for a period of more than 24 hours. As long as the motor remains mobile or in transit (defined as remaining at the same location for less than 24 hours), the temporary transit site does not have to meet storage QD siting requirements.

2.8.2 Transit Security Live Motor

Road - Dual person observance, 24 hour guard.

Air - Dual person observance, 24 hour guard.

2.9 Emergency Response

The Silo Based ICBM System Program Office (LM) located at Hill AFB, UT is responsible for accomplishing recovery operations for all LGM-30 (Minuteman) mishaps for which Hill Air Logistics Center (ALC) has investigation and recovery responsibility or when ALC assistance is requested by the user. Under the ALC, the directorate of safety (LMS) maintains recovery teams with a capability to cope with any recovery or disposal operation. The team personnel are on call 24 hours a day, 7 days a week. The LM Alert Center is manned 24 hours a day to receive assistance requests; they may be contacted at 801-777-6072 utilizing both commercial and DSN lines. The recovery procedure for a loaded unit will not be initiated until an Explosive Ordnance Disposal (EOD) release for further recovery action has been obtained. All recovery operations will

be directed by an On Scene Commander (OSC) and the designated Emergency Response Team Chief (ERTC) with assistance from LM engineering, technical and safety staff. Recovery procedures for LGM-30 Transportation and Missile Handling Equipment are contained in Guide 93-3, dated April 94. It is not intended that the procedures contained therein will cover all situations. It must be realized that pertinent factors such as location, terrain, weather, accessibility, imminent hazards to civilian population, and availability of equipment will all affect recovery methods. Each situation must be carefully analyzed to determine the optimum method of accomplishing the recovery operations.

2.10 Environmental Assessment (EA)

Movement of government rocket motors constitutes a federal action and requires compliance with:

- Council on Environmental Quality CFR 1500
- DODD 5000.1
- AFI 32-7061

Previous EAs for Minuteman stage transport to Navajo, Pueblo, Redstone, Patrick, and Kirkland shall be utilized to the fullest extent possible. Air, road, and water alternatives require EAs addressing the issues of air quality, biological resources, cultural resources, noise, and hazardous materials/waste management, including accident scenarios. An AF Form 813 will be completed prior to shipment to comply with this requirement.

2.11 Air Transport Requirements

2.11.1 Delivery of M-56 A1 Motor

Delivery of the motor is accomplished utilizing a Figure A-101 semi-trailer for ground transport and shipment in a C-5 aircraft. The C-5s reside at the 60th Air Mobility Wing at Travis AFB, CA. This is the preferred wing as this location is nearest to Hill and Kodiak, thus reducing flying time. In addition to Travis, other Wings have participated, the 439th and 337th Westover AFB, MA, and the 433rd Kelly AFB, TX. Utilization of any Air Mobility Command (AMC) aircraft must meet the requirements of MIL-HDBK-1791 which warrants restraint design of articles be able to withstand the following forces; forward 3 g's, aft 1.5 g's, lateral 1.5 g's, up 2 g's and down 4.5 g's. This requirement applies to all AMC aircraft; they do not assign specific values to an aircraft type. A design package must be submitted to ASC/ENFC Wright Patterson AFB, OH for approval no less than 120 days prior to the mission. Once approved, a letter of certification is issued to the requesting agency stating the article meets the requirements. The aircraft loadmaster, prior to uploading, validates a copy of the certification. A "C" (Charlie) model Figure A-101 is the preferred trailer, as it provides 12 inches of clearance between the trailer roof and the aircraft overhead (Figure 2.11.1-1). This clearance is invaluable when cresting and negotiating the aircraft ramp angle during up and download operations. Ingress of the Figure A-101 will be through the forward section of the aircraft, backing in.

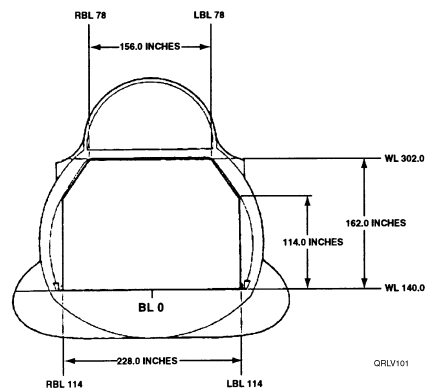


Figure 2.11.1-1 C-5 Clearance Envelope**2.11.2 Hill AFB Air Operations**

Hill AFB has been selected as the air departure and return point for Kodiak missions. The Air Terminal Operations Manager is Mr. Jim Adams, commercial phone 801-777-3088 or DSN 777-3088. Air Tower operations are conducted 7 days a week; hours of operation vary - Monday through Friday 0600- 2000, Saturday and Sunday 0700- 1600. F-16 missions can extend the closure to 1800 on weekends or holidays. If any flights out or inbound are required outside of these windows, then provisions must be made in advance to extend the hours of operation. In addition to providing excellent runway and air terminal services, Hill is also home for OO-ALC/LMSS. The Missile Maintenance Support Branch provides a comprehensive transportation and storage program for ICBM assets and related major components. Transportation and storage is accomplished with a fleet of weapon systems peculiar equipment as well as general-purpose vehicles managed by the Branch. Motor vehicle and equipment operators within the Branch have the responsibility for safe delivery and operations at Hill AFB and the using destination. Ms. Brenda Chatlin, phone 801-777-6574 or DSN 777-6574 manages the Branch.

2.11.3 463L Pallet Handling

Past missions have required the marrying of 463L pallets into a train, which supports handling of over-length items. For the QRLV mission, no K loaders will be available; therefore, pallet trains will be restricted to no more than two. Removal from the aircraft can be accomplished utilizing two forklifts operating in tandem to place onto semi-trailers. Trains longer than two pallets must be broken down on the aircraft and reloaded onto semi-trailers as individual pieces. Spacemark, Inc., a support contractor, furnishes the semi-trailers for the Coast Guard at Kodiak. Shoring (4x wood sizes) must be used beneath the pallets to avoid damage to the underside of the pallets and facilitate forklift tine clearance. This shoring must remain with the pallets and be utilized to the fullest extent during the mission. Under an Air Force Memorandum of Agreement (MOA) with the Coast Guard, Spacemark, Inc., provides the equipment and personnel required to download the aircraft and deliver the inbound cargo to KLC. They also support outbound shipments and uploading activities.

2.11.4 Inclement Weather

Up and download operations during wet conditions will require use of the aircraft winch system to the fullest extent. The ramp, when wet, becomes a slick surface even though equipped with a non-skid surface. This, coupled with wet tires on the motive source, tractors, tugs, etc., can become a dangerous situation and every precaution must be exercised during wet conditions. Vehicles tend to lose traction on the ramp angle even in the aircraft maximum kneeled position. The winch also acts as a breaking device during shoring placement, which is used to provide adequate ground clearance for vehicles and equipment when cresting the ramp angle.

2.11.5 Flight Path and Notification

The flight path from Hill AFB will traverse over 1,075 nautical miles (nm) of land and 615 nm of ocean before reaching Kodiak, AK. This is the path the 60th Air Mobility Wing has identified for this and previous missions. Flying time can vary depending on weather conditions; favorable conditions 5.25 hours. A map and vectors are contained in Figure 2.11.5-1. Establish a notification point of contact at the Kodiak airport staging area to receive inbound aircraft status. This information will then be provided to awaiting ground support personnel for actual arrival. Additional flight status information can also be acquired from the TACC (Tanker/Airlift Control Center) at Scott AFB 1-800-247-6625; they are manned 24 hours. Provide mission or tail number located on the load plan. Surveillance of Hill to Kodiak flights and reverse are generated from the TACC West Cell.



Figure 2.11.5-1 Typical Flight Path, Hill AFB to Kodiak Airport

2.11.6 Preparation Activities

Prior to aircraft arrival and before upload operations begin, a myriad of activities, not limited to the following, must take place.

- Obtain from providers a complete and accurate shipment list including envelope and weight and description of crated materials. Crated material weighing more than 150 lbs. must have forklift provisions.
- Permanently mark or stencil contents on exterior of crates. This will aid in repackaging for the return shipment.

- All Haz-Mat items must be accompanied by a Shippers Declaration for Dangerous Goods form. Each item must have its own declaration; only one annotation per form is authorized. The form, a C83R Labelmaster, (1-800-621-5808) is utilized; it contains the original and provides three carbon copies. One copy is securely attached in plain view to the item or its crate; two copies are passed to the Flight Commander for his/her concurrence prior to any aircraft upload activities commencing. The original is maintained as a record of manifest at the participating air terminal (departing or arriving).
- Ensure all crates have a packing list attached with description and weight of each article. All Haz-Mat crates must display proper shipping labels. Crate and contents must be weighed and marked.
- Ensure all crates and articles have been adequately weatherproofed for high wind and rain conditions; these items will go unsheltered until delivery to KLC.
- Identify unusual cargo that may require special handling i.e., Haz-Mat, pallet train, large forklift, low ground clearance vehicles, environmental monitoring, ramps or special shoring requirement, aircraft winch handling, etc.
- All equipment must arrive at airfreight five business days prior to departure. This allows time for palletizing, weighing and developing an aircraft load plan.
- Establish Passenger (PAX) Manifest three weeks prior to departure. Include name, SSN, rank/grade, and organization. Contractors must have contractor orders.
- Obtain flight line access badge containing an approved photo.
- Program Office represented at the airfreight terminal, at least one full day prior to departure.
- Ensure Certificate of Equivalency (COE) and Hazardous Declarations, if required, are prepared and available.
- Have Air Certifications available, if required, for the Loadmaster.
- Request fully complimented aircraft, additional tie-downs, and 200 ft. grounding cable.
- Obtain an agreement in writing from Hill Operations for departure or arrival support after normal duty hours. Funding for overtime will be required.
- All vehicles weighed, axle loads defined and Center of Gravity noted two days prior to departure.
- Disconnect batteries and tape terminals on vehicles after uploading; all fuel tanks are not to exceed 1/2 capacity.
- Load Plan, once completed, is faxed to download P.O.C. at Kodiak. The plan must also contain the mission number and aircraft tail number for in-flight progress tracking.
- Discuss with aircrew refueling and ground support requirements for both Kodiak and Elmendorf AFB.
- Ensure Manifest will support all returning of cargo.
- If in doubt, acquire double the amount of dunnage and shoring for download ops and handling/storage of 463L pallets, Kodiak resources are limited.
- If dirty, wash and dry all vehicles prior to uploading.
- Conduct teleconference with receiving personnel one day prior to departure. Note any changes or new requirements that may have transpired during upload.
- Notify Elmendorf AFB mission is airborne and services may be required if Kodiak weather becomes too inclement to land or mechanical anomaly is encountered.
- Arrival day, contact Kodiak Meteorology at least every three hours, as weather can degrade or improve within this timeline.

- Determine Kodiak ETA and notify download personnel so they can prepare to stage equipment and receive the aircraft.

2.11.7 Kodiak Airport

Kodiak is a joint tenant airport being shared by both commercial and Coast Guard activities. It is operated and maintained by the Federal Aviation Administration (FAA). Commercial operations are active between the hours of 0700 and 2300. The airport is serviced by turboprop and jet aircraft operated by Alaska Airlines and ERA air services. It provides three runways and is capable of handling C-141B and C-5 aircraft. Coast Guard missions are flown on a 24-hour stand-by notification for search and rescue activities. They fly C-130 aircraft, H-60 and H-65 helicopters.

They typically taxi and take-off from any of the three runways; the one they select is dependent on wind conditions. These activities are unpredictable as they are in response to emergency situations. Runway 7-25, the longest of the runways measuring 7,562, is capable of landing the C-5; depending on aircraft weight, the entire length may be utilized. The follow me truck should hold at taxiway Echo until the aircraft starts the rotation on circle 7. After rotation, proceed south on 7-25 and turn left onto taxiway Echo (Figure 2.11.7-1). Taxiway Echo is the preferred area for download operations. It is equipped with an aircraft grounding point at mid-length, which can support C/D 1.1 shipment handling. Utilization of Echo eliminates the need to respot the aircraft if a RON (Remain Overnight) is required. An alternative download area would be the use of Runway 10. After rotation, proceed south down 7-25 and turn left on runway 10-28, proceed north to circle 10 and hold. This will place the grounding rod beneath the left wing. Runway 10 can also be used as an off-load area for hazardous materials, particularly C/D 1.1 shipments. (Figure 2.11.7-2) Both areas are relatively flat and constructed of 8" concrete and topped with 2" of asphalt, adequate enough to support the weight of the C-5 and the cargo. Runway 10 is an active runway and should only be used as an alternative download area. After completion of the download and it is determined a RON is required due to time limitations or pre-arrangement, the aircraft must be respotted midpoint on taxiway Echo. All handling equipment enters and exits the download site via Gate G. Entry to this gate is the next driveway south of the Buskin River Inn. Spacemark, Inc. has keys to this gate and does not have to rely on airport personnel to open and close. The road from this gate ends at taxiway Echo and offers a good level staging area away from the aircraft. DO NOT use Gate G for egress of a Haz-Mat placarded vehicle, as it will pass next to the Buskin River Inn; utilize Gate D instead. This is a remote gate east of the runway. It is accessed by a perimeter road leading from the staging area and will place the convoy directly onto Rezanoff Hwy. Utilization of this remote gate does not encroach upon inhabited buildings such as the Buskin River Inn. This will keep the environmentalists from laying claim lives are being placed in jeopardy. The Airport Authority controls Gate D and they must be notified for opening and closing. The State Police must also be notified of an approximate time the convoy will approach the highway; they will provide traffic control at the highway entry point.

2-8



Figure 2.11.7-2 Aircraft Off-load Area Kodiak Airport

2.11.8 Airport Restrictions

Delivery of Explosives cannot occur during normal airport operations (0700 to 2300). The Quantitative Distance circle for explosives encroaches on the airport terminal; therefore, these shipments arrive after the 2300 closing and must depart prior to opening at 0700. Aircraft interior lighting and exterior portable light plants provide the necessary illumination (Figure 2.11.8-1). Nonexplosive and empty flights can and have landed during normal airport operations. These flights must be identified and cleared with the FAA 72 hours prior to their arrival or departure. An example would be pre-position inbound and post-launch outbound flights.



Figure 2.11.8-1 airt Download Operation on Taxiway Echo

2.11.9 Spacemark, Inc.

The Coast Guard at Kodiak has contracted with Spacemark, Inc., to perform all maintenance and logistics functions at the base. Their services can be utilized to support download operations from the C-5 and delivery to KLC. They supply all equipment and operator personnel which includes; 10 and 12K forklifts, crane, any tractors necessary to download trailers, follow me truck, light plants, shoring for pallet handling, bus for delivery of passengers if required, 40-foot flat bed semi-trailers for pallet delivery to KLC, ambulance and fire equipment. Spacemark supports the download and delivery to KLC operations after their normal duty day (0700 to 1600). Depending on aircraft arrival time, late evening, or complicated download, they may elect to store non Haz-Mat items at the storage lot (open) of Building 25 until the next day after 1600. If daily work commitments have been accomplished for the day, then delivery to KLC can commence. LMSS or certified Air Force personnel upon arrival must deliver haz-Mat items to KLC, as the Coast Guard Base has no storage for this material.

2.11.10 Aircraft Refueling

The Coast Guard provides aircraft refueling only on request from the aircraft Commander. They have three tankers (2) 30 kips and (1) 40 kip capacity and are not equipped with large flow hoses for C-5 refueling. These tankers provide fuel for the helicopters and C-130 aircraft. One hundred to one hundred forty kips of fuel is not an unusual request and can take as long as seven to eight hours or longer to complete, depending on their priorities. Taxiway Echo is on the far side of the Coast Guard Base and travel to and from the tank farm can be time-consuming, as these tankers in past cases have had to wait until runways become inactive before proceeding. Aircraft refueling at Elmendorf is the preferred method, as they are equipped to refuel this size of aircraft.

2.11.11 Small Quantity Explosive Storage

The return of ait-2 explosives (spares) required the use of a Coast Guard magazine. This was prearranged with Chief Kriski, the OPR of the magazines. These facilities are located off base on Annton Road. The chief has assigned Building 125 for our use. It is a clean and very dry facility constructed of concrete, containing two heavy steel 48-inch wide doors and the top and sides are bermed with earth. These magazines are rated for limited amounts of explosive, mainly ammunition. Aircraft departure was scheduled for 0700; therefore, it was prudent to transport the explosives from KLC the day before departure. Shipper Declaration for Dangerous Goods forms were completed using only one annotation per form. A copy, along with the proper shipping label, was securely attached to the container in plain view. Two copies were passed to the Flight Commander for his concurrence prior to the commencement of any upload activities. Permits were obtained from the State Trooper's Office for transporting explosives on Kodiak; a copy was contained in the transporting vehicle. Explosive placards were affixed on all four sides of the transporting vehicle. The vehicle size and limited quantity did not require escort vehicles. Pick-up at Building 125 occurred at 0500 and proceeded to Gate "D", where we were met by the FAA and escorted to the aircraft. These articles were palletized, segregated and secured once inside the aircraft.

2.11.12 Meteorology

On the island of Kodiak, fog can be a problem and remain for uncertain periods. Aircraft departure can be accomplished but landings are unauthorized during these conditions. The Coast Guard C-130s flying Search and Rescue missions frequently divert to Elmendorf AFB and wait until the condition clears before returning to Kodiak. Runway 7-25, the longest of the runways, can accommodate takeoff of the C-5; however, it requires a south wind. Prevailing winds at Kodiak are generally from the Northwest, depending on the time of year. Wind is another factor for up and download operations.

2.11.13 Kodiak Climatology

The climate found at Kodiak (Table 2.11.13-1) is very similar to that of southeast Alaska. Because of the oceans, mountains, warm Asian winds and storms blowing in from the gulf, this area can have a considerable variation in temperature, sunshine, rain and snowfall. Information for the following table was obtained from the Air Force, Alaska Weather Operations Center (AWOC), located at Elmendorf AFB. Their mission is to provide meteorological and oceanographic services for the Department of Defense operations in the Alaska region. Period of this record is 1/1/1973 to 1/1/1999.

<i>Average Activities</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
<i>Min Temp f</i>	24.7	24.9	26.9	31.4	37.5	43.6	48.2	48.4	43.4	34.2	28.8	25.2
<i>Max Temp f</i>	35	36.1	38.9	43.7	49.5	55.6	60.5	61.9	56.6	47.2	39.9	36.4
<i>Days below 32 f</i>	22	21	21	14	3	0	0	0	1	12	18	22
<i>Precipitation in.</i>	7.38	5.28	4.63	4.2	5.52	4.78	3.7	5.15	6.99	7.18	5.96	6.81
<i>No. Days Prec.</i>	17	16	16	16	18	15	15	14	16	16	17	17
<i>No. Clear Days</i>	5	6	6	5	3	3	3	4	4	6	7	6
<i>No. Cloudy/PC Days</i>	26	22	25	25	28	27	28	27	26	25	23	25
<i>A.M. Humidity %</i>	79	79	77	73	76	79	82	81	81	78	78	77
<i>P.M. Humidity %</i>	75	73	69	68	72	75	77	74	73	69	72	74
<i>Snowfall in.</i>	15.4	17.8	13	8	0.7	0	0	0	0	2.3	7.7	13.2
<i>Wind Speed mph</i>	12.8	12.4	12.3	11.6	10.6	9.3	7.6	8.2	9.7	11.2	12.4	12.4
<i>Hours of Daylight</i>	7	8.2	10.3	13.6	16	17.4	16.9	16.7	13.1	10.3	8.4	6.9

Table 2.11.13-1 Kodiak Climatology

2.12 Road Transport Requirements

2.12.1 Vehicle Attributes

Kodiak falls within the Central Region jurisdiction of the Alaska Department of Transportation and is bound by the seasonal weight/load restrictions that are imposed by the Department on its road system for all vehicles over 10,000 GVW. These annual restrictions are very dependent upon weather and frost depth but typically occur between March and June. They can reduce the allowable gross vehicle weight by as much as 50%. Last year (1999), a 50% restriction began March 1st and was elevated to 75% by May 17th, before returning to 100% summer conditions by May 24th. Application for an oversize vehicle permit (Erector) filed in February was denied and not issued until May 24th. Table 2.12.1-1 identifies legal maximums for vehicles that may pass through those states, en route to Seattle for barge transport to Kodiak.

<i>STATE</i>	<i>Length</i>	<i>Height</i>	<i>Width</i>	<i>Single Axle Wt. (lbs.)</i>	<i>Tandem Axle Wt. (lbs.)</i>	<i>Gross Vehicle Weight (lbs.)</i>
<i>California</i>	135 ft.	14 ft.	102 in.	20,000	34,000	80,000
<i>Utah</i>	N/L	14 ft.	102 in.	20,000	34,000	80,000
<i>Idaho</i>	105 ft.	14 ft.	102 in.	20,000	34,000	105,500
<i>Oregon</i>	140 ft.	14 ft.	102 in.	20,000	34,000	105,500
<i>Washington</i>	140 ft.	14 ft.	102 in.	20,000	34,000	105,500
<i>Alaska</i>	N/L	14 ft.	102 in.	20,000	38,000	GVW

(N/L) No Limit/within reason

GVW: Governed by bridge formula

Table 2.12.1-1 State Legal Envelope and Axle Load Limits for Road Transport

2.12.2 Road Vehicle Operations

OO-ALC LMSS will provide trained operators for all Figure A-101 tractor/trailer operations and during rocket motor transport.

2.12.3 Maximum Speed

Maximum towing speed of the Figure A-101 on level smooth surface is a governed 55-MPH loaded. Maximum sustained speed on a continuous 5% grade is dependent on the prime mover motive power.

2.12.4 Pilot Vehicles

Alaska DoT requires a lead pilot vehicle for oversize and large Haz-Mat movements. (Figure 2.12.4-1) Two vehicles will be provided by the Air Force, along with the necessary communication equipment. These vehicles and personnel will also control traffic through narrow or curved areas where there is not enough room for two vehicles to pass. They will also warn motorists of the oncoming convoy and transmit to the convoy any forward anomalies. An EOD team driving a special vehicle will trail the convoy. All vehicles have the capability to transmit and receive radio transmissions, with exception of the Figure A-101 that cannot transmit.

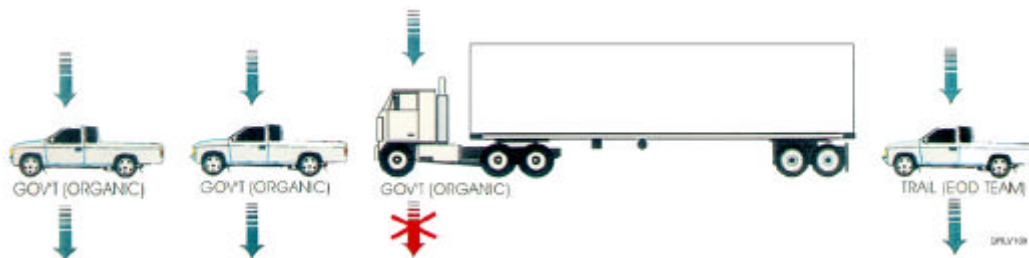


Figure 2.12.4-1 Typical Delivery Convoy

2.12.5 Kodiak to AADC Launch Site

A map of the Kodiak area is shown in Figure 2.12.5-1. Also provided is a Site map for the Kodiak Launch Complex, Figure 2.12.5-2.

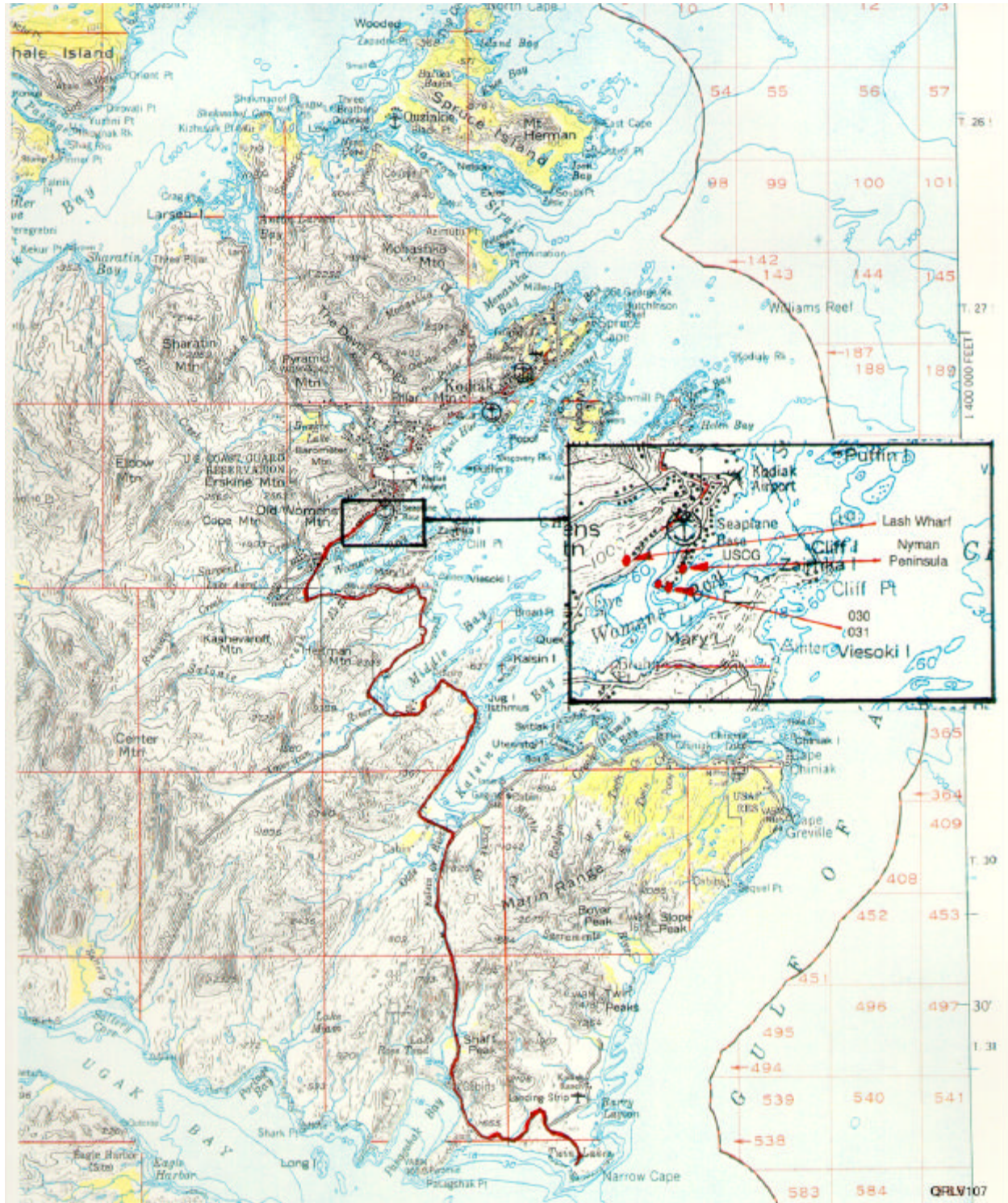


Figure 2.12.5-1 Kodiak Area Map

- Heading south from the airport on Rezanof Drive, this portion is paved but only for 5.4 miles. The remaining 35-mile route is unpaved crushed rock and sand composite (base course). There are extensive portions of washboard and rutted surfaces, numerous switchbacks, and grades approximately 5-8%. The crushed rock is composed of shale-like material and extremely sharp; it can easily puncture a truck tire. Spare tires in serviceable condition are highly recommended for all vehicles.
- All vehicles produce a large amount of permeating fine gray dust when the road surface is dry. Depending on the size, weight and speed of the vehicle, visibility can be reduced to near zero.
- The majority of the bridges are constructed of pre-cast concrete and supported by steel I-Beam joists and pilings (Figure 2.12.5-3). There are also corrugated drainage tubes ranging from 10" to 16" diameter and placed from between 8' to 15' below the surface at creek and small stream crossings.
- The state is constantly grading these roads to smooth potholes and washboard undulations. The winter months produce severe icing conditions. These roads are not plowed and left to melt naturally.
- MP 19.1 - Tight sloping switchback (Figure 2.12.5-4).
- MP 22.2 - Long downgrade approximately 8% for 1.4 miles to Kalsin Bay. This portion has been straightened and the road surface improved. (Figure 2.12.5-5).
- MP 25.3 - Pasagshak Road right turn - Can be negotiated utilizing both lanes; pilot vehicles will be required to control traffic. This should not be a problem as little to no traffic exists.
- MP 34.4 - Tight area, narrow curve leading to rock out-cropping with cantilevered ledge on one side; Pasagshak Bay drop-off and loose rip-rap shoulder on the other (Figure 2.12.4-6).
- MP 34.7 - Up-hill widened S curve portion, posted. This stretch of road has been cut, filled and widened; this work was completed by the State of Alaska.
- Pasagshak Point Road MP 37.8 leads to the Launch site area; this portion is now paved.
- Note: MP35 to site - There does exist a large unattended heard of Buffalo that roam and graze in this area. It is not uncommon to see these animals lying and walking on the road. They are slow to move and reduced speed and caution should be exercised while in this area.

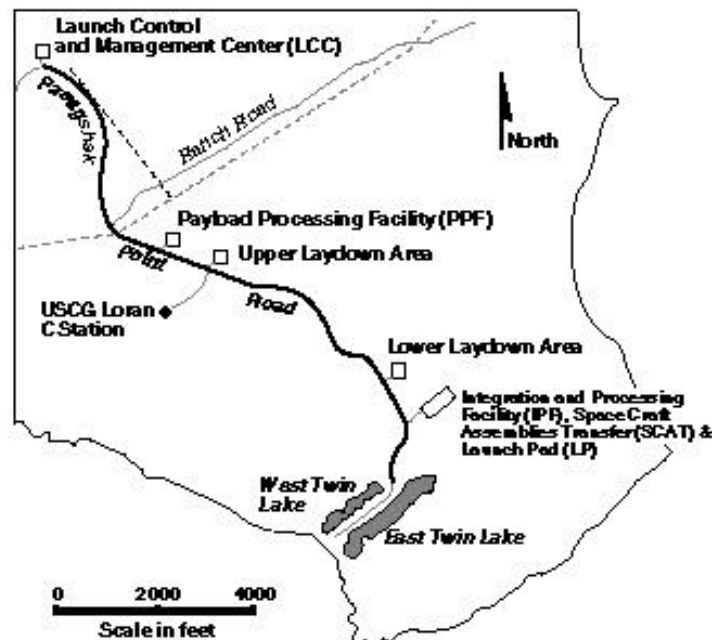


Figure 2.12.5-2 Kodiak Launch Complex - Site Map



Figure 2.12.5-3 Typical Upgraded Bridge Structure along Chiniak & Pasagshak Roads



Figure 2.12.5-4 Tight, Sloping Switchback at Mile 19.1



Figure 2.12.5-5 8% Grade Down to Kalsin Bay at MP 22. 2



Figure 2.12.5-6 Tight Area, Narrow Curve, Pasagshak Bay Drop-off at Mile 34.4

2.13 Water Transport Requirements

Samson barge shipments from the Port of Seattle occurs every two weeks year around. Prior coordination with the carrier must be rendered to ensure deck availability and schedule. The shipper does not control or influence barge scheduling. If improperly coordinated, this could result in a two-week slip. Their schedule is tight, as the other ports-of-call have limiting wharf facilities and the demand is high, as other carriers are also utilizing these facilities. Two barge companies, Crowley and Samson, service Kodiak. Both carriers responded to a rate request. Samson was chosen, as Crowley costs were more than double and their sailings infrequent. Water transport of the GSE without a live rocket motor to and from Kodiak is cost effective over the air alternative as long as it does not become a schedule driver. The GSE weights and envelopes, except for ground clearance do not present any problems for barge transport.

2.13.1 Loading and Unloading

The barge must align with the docks in the same configuration for loading and unloading. The alignment and loading and unloading procedures must be similar at both Seattle and Kodiak. The mean Seattle tides run at 12-ft. intervals. Typically, wheeled vehicles up to 40 ft. are loaded onto flats and crane-hoisted aboard. If the 40-ft. is exceeded, then wheeled equipment must be driven onto the barge at the highest tide. This accommodates the least ramp angle between the wharf and barge. This reduced angle will then allow the 10.5-inch ground clearance of average landing gear assemblies to crest the ramp without interference. Barge Ramp #1, 25 ft. wide by 75 ft. long, has steep ramping at both ends and not conducive to the limited ground clearance of the GSE (Figure 2.13.1-1). This ramp could be used, but in a limited window, because of the 12 ft. tide the port experiences in a 12-hour period. The barge and pier would have to be in perfect plane to transload the GSE. Additional ramp wedging could be used to aid in providing the clearance. Ramp #2, 35 ft. wide by 100 ft. long, continuous flat, with no excursions and a capacity of 259 tons, offers the best loading solution (Figure 2.13.1-2). The barges are normally 76 ft. wide by 400 ft. long; useable maneuvering deck area is 70 ft. by 394 ft. Planning and care are extreme as other cargo, International Standards Organization (ISO) containers and equipment are being loaded concurrently. The barge is shared with other customers and not dedicated solely to the GSE delivery (Figure 2.13.1-3). It is imperative that any GSE positioned on the barge be placed so that it will not have to be removed at any of the three ports-of-call during on and off-load operations. Anchorage to the barge is through rails equipped with four shackles spaced within one foot increments; chains are passed through the shackles and final attachment to the article is made with D'ring links (Figure 2.13.1-4). The rails run parallel in sets of two spaced at 48 ft. apart. The barge carrier can deliver containerized shipments to KLC. The Samson 2000 schedule is shown in Table 2.13.1-1.

Dep SEA	Arr KOD	Dep SEA	Arr KOD	Dep SEA	Arr KOD	Dep SEA	Arr KOD
05/31	06/11	06/14	06/25	06/28	07/09	07/12	7/23
07/26	08/06	08/09	08/20	08/26	09/03	09/06	09/17
09/20	10/01	10/04	10/15	10/18	10/29	11/01	11/12
11/15	11/26	11/29	12/10	12/13	12/24	12/27	01/07

Dep KOD	Arr SEA	Dep KOD	Arr SEA	Dep KOD	Arr SEA	Dep KOD	Arr SEA
01/04	01/19	01/23	02/02	02/01	02/16	02/15	03/01
03/01	03/15	03/14	03/29	03/28	04/12	04/11	04/26
04/25	05/10	05/09	05/24	05/23	06/07	06/06	06/21
06/20	07/06	07/04	07/19	07/18	08/02	08/01	08/16

Table 2.13.1-1 Samson Tug and Barge Schedule 2000



Figure 2.13.1-1 Barge Ramp #1, Banana Style



Figure 2.13.1-2 259 Ton Straight Ramp #2 in Seattle
This type is hinged at the wharf and has no transition angles like the Banana style.



Figure 2.13.1-3 Typical Barge Bound for Kodiak



Figure 2.13.1-4 Deck Tie Down Arrangement for Securing Cargo to Barge

2.13.2 Natural Environments

All shipments shall be protected from natural environments, namely salt water spray and rain, which will likely be encountered during the voyage. Samson, at an additional cost, will provide and apply weatherproof coverings to shield the GSE from the elements.

2.13.3 Sea Voyage

The voyage from Seattle requires 10 days and three ports-of-call before arriving at Kodiak. The first port is Sitka (five days), then on to Cordova (two days), next to Valdez (one day) and on to Kodiak (two days) (Figure 2.13.3-1). The leg from Seattle to Sitka can encounter 20-foot winter seas produced by strong prevailing winds from the Gulf of Alaska. Sea conditions in the summer run in the 3' to 4' range. All barges are equipped with a spoon bow to deflect wave activity during sea transit. Tugboats are ocean-going type and produce 3,000 HP. A barge is usually towed at between 300 to 400 yards from the tug. Towing speeds range between 7 to 9 knots; this is dependent on sea conditions. The tug and barge navigate through the Queen Charlotte Sound and the Hecate Straights. This route provides the safest passage, as numerous islands and inlets provide safe havens from heavy sea periods. The remainder of the voyage is sheltered, as it traverses south of the Alaska mainland. Fog, though prevalent, is not a deterrent. The carriers working the Alaska shipping lanes are equipped with Loran and Spin 15 all weather navigational aids.



Figure 2.13.3-1 QRLV Sea Shipment Route

2.13.4 Off-Load

Off-load is conducted at Lash Wharf located on Women's Bay, Kodiak. This facility is primitive in comparison to Seattle; however, they manage to handle an extraordinary amount of cargo across this wharf. The ramps are identical to those discussed as Ramp #1 (Banana style) in Seattle (Figure 2.13.4-1). Off-load of cargo, primarily ISO containers is accomplished using large 40 ton forklifts and resident cranes (Figure 2.13.4-2). They typically translate athwart-ship; however, the maneuvering area is limited. The preferred method of off-load would be from the stern. The barge could be held fast with a tug and shore bollard to maintain position. There is an indentation in the stern to receive the ramps. About 18' of wedge shoring would be required to translate from the barge deck to the ramps. This would allow for a straight drive-off to the dock with favorable tide conditions. The Samson fleet is comprised of five barges, four of which are configured with the stern indentation. This must be taken into consideration when setting up the passage.



Figure 2.13.4-1 Banana Ramp at Lash Wharf Kodiak
Additional jump ramps will be placed at bottom to provide adequate ground clearance for GSE landing gear.



Figure 2.13.4-2 Forklift with 30" Ground Clearance Approaching Ramp Crest
Tide level at 4 feet

2.13.5 Alternate Handling

Samson Tug and Barge at Kodiak is also equipped with two 300-ton lattice boom cranes. These cranes assist the forklifts during on and off-load operations. Instead of using the ramps for traversing on and off the barge it may be wiser, less time-consuming and safer to utilize these cranes, as the Banana style ramps may prove extremely challenging. The Figure A-101 would be driven onto a 40 ft. flat, secured, weatherproofed and hoisted aboard. This is a common practice for large vehicles having a low ground clearance. The rail set was successfully shipped in this manner. These flats are limited in number and would have to be assigned and pre-positioned by Samson at Seattle prior to the loading. The Erector has lifting provisions at the frame and above the outriggers, which could accommodate the cables for lifting, as it exceeds the 40-ft. length of the longest flat. It would be placed flat on the deck, secured and weatherproofed.

3.0 GROUND SUPPORT EQUIPMENT (GSE)

All required GSE shall be shipped to the launch site and be available to support receipt, integration and emplacing the assembled motor on the launch stand. This GSE must be in place for pathfinder. The required GSE is comprised of the following items:

3.1 QRLV Erector

The erector elevates the motor from horizontal to vertical for emplacement on the launch stand and to receive a motor, if required, being removed from the launch stand. Additionally, it receives a motor from a rail set via an overhead facility or mobile crane. Hydraulic and electrical systems are integral parts of the erector. The semi-trailer consists of a three-axle mainframe assembly constructed of high-strength steel. Cradles attached to the pivoting secondary frame structure support the motor. Motive power is provided by a Brechan tractor under contract to the Coast Guard, thus reducing any additional GSE. Envelope dimensions are 45 ft. 6 in. long, 8 ft. 4 in. wide, and 11 ft. 2 in. high, with erector support plate attached, weight 57,180 lbs. (Figure 3.1-1 & 3.1-2). A tractor, in combination with a semi-trailer during air shipments, may not always be available; therefore, load spreading and floor protection must be provided under the landing gear feet. Shoring area shall be sufficient to provide aircraft floor contact pressure of less than 50 psi. Additional shoring will also be required at the tandem for up and download operations on and off the aircraft. This is necessary for the outriggers and landing gear to clear the ramp crest angle of the aircraft and prevent damage.



Figure 3.1-1 QRLV Erector Elevating the ait-2 Booster and Payload



Figure 3.1-2 ait-2 Booster and Payload on the Erector in the Integrated Process Facility (IPF)

3.2 M-56 A-1 Motor Carriage

The motor is supported during transport and storage by a second stage motor carriage. The carriage consists of a suspension system, supporting structure, running gear, and vertical restraint bands. The suspension system uses torsion bars and resilient pads to provide controlled dynamic springing characteristics for all modes of motor transport. The supporting structure assures a favorable load distribution throughout the length of the motor. The running gear provides compatibility with the V-rail restraint system within the Figure A-101 trailer and the rail set. Vertical restraint bands provide for motor restraint during handling and transporting operations.

3.2.1 Carriage Properties

The carriage weight and envelope is 9 ft. long, 6 ft. 7 in. wide and 2 ft. 11 in. high and weighs 1,380 pounds.

3.3 Rail Set and Properties

The rail set accommodates egress of a stage motor from within the Figure A-101 trailer. It is equipped with a matching "V" and bridge rail system to allow the transfer. Transfer is accomplished utilizing a cable powered by the trailer winch and a snatch block attached to the aft frame of the rail set. Cable attachment is to the carriage. After transfer onto the rail set, the motor can then be lifted by either a portable or facility crane onto the Erector for processing. The rail set is constructed of steel having dimensions of 20'-0" L x 6'-11" W x 5'-6" H and weighs 8,620 pounds. Due to the size and noncomplexity, this item was shipped by barge to KLC to support the ait program (Figure 3.3-1).

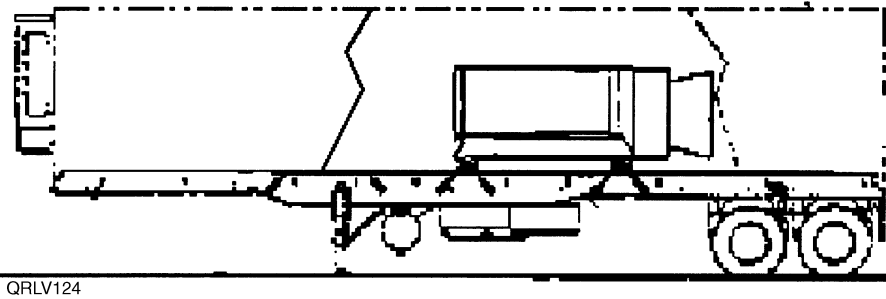


Figure 3.3-1 ait Booster Being Transferred from the Rail Set to the Erector

3.4 Figure A-101, Rocket Motor Semi-Trailer

The semi-trailer is an enclosed van-type transporter designed to transport Minuteman rocket motors in a controlled temperature environment. The trailer is capable of transporting various motors in their respective carriages and in various quantities and combinations. Specific arrangement and restraint of the M-56 configuration within the semi-trailer is contained in T.O. 36A9-11-3-31 (Figure 3.4-1). Additional restraint will be required for air transport, specifically to meet G-force accelerations in all three axes. This is accomplished through the use of additional forward and aft restraint assemblies. Approval by ASC/ENFC has been granted for M-56 shipments by air on a skid device in Figure A-101. The semi-trailer restraint to the aircraft floor is accomplished through the use of swivel hoist rings threaded into non-used carriage restraint openings on the semi-trailer frame. A tractor, in combination with the semi-trailer during air shipments, may not always be available; therefore, load spreading and floor protection must be provided under the landing gear pads. Shoring area shall be sufficient to provide a floor contact pressure of less than 50-psi. Additional shoring will also be required for up and download operations on and off the aircraft. This is necessary for the landing gear to clear the ramp crest angle of the aircraft and prevent damage. Shoring is commonly comprised of wood components typically 2x material in large widths; lengths of this material are sized to match the extreme width of the vehicle or component it will support. Plywood squares 18'x 18' or larger can also be used as shoring; however, placed under an active tandem wheel set, they have a tendency to slip and eject. This can present a dangerous situation for both personnel and equipment. The aircraft does not supply shoring; this is provided by the Hill Air Terminal 75th ABW. The amount of shoring and type is determined during upload operations by the varying vehicle clearances in relation to ramp cresting. An Auxiliary Power Unit and Environmental Control System (APU/ECS) provides the electrical power for operation of system components and for temperature control of the van compartment. The APU is a diesel-powered generator, which produces 240 VAC for powering the winch, hydraulic power unit, and the ECS. The ECS provides the heating and cooling capacity to maintain the temperature inside the van at acceptable levels throughout the

operating temperature range. Envelope dimensions are 35 ft-long, 8-ft. wide and 12 ft. high. Empty weight is 17,000 pounds. Explosive placards denoting the class and level of contents must be displayed on four sides when transporting live motors.

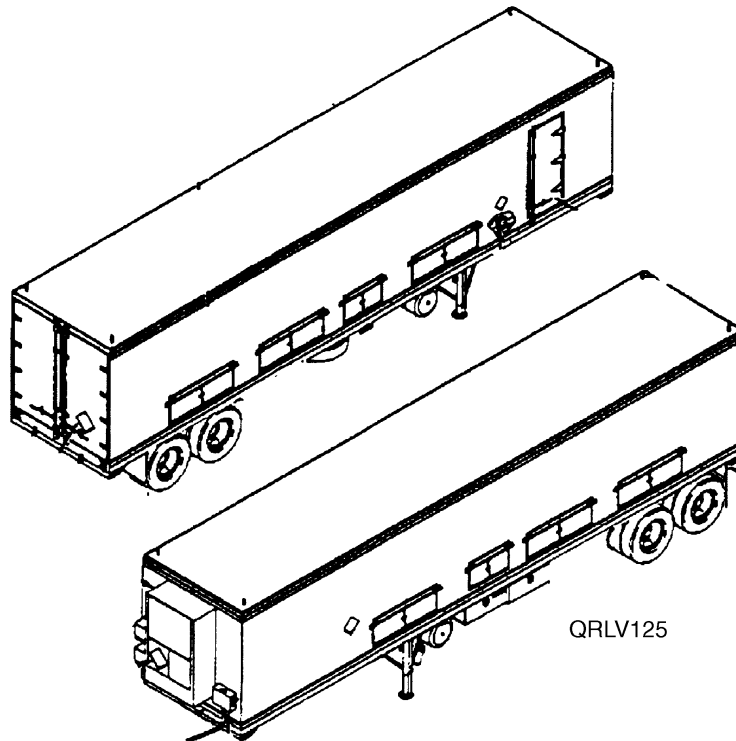


QRLV124

Figure 3.4-1 M-56 A-1 Arrangement within Semi-Trailer

3.5 Figure A-101 Tractor

Use of the standard 6x4 Volvo White tractor would be adequate to support movement of the semi-trailer and its contents (Figure 3.5-1, -2). The tractor provides compressed air to the semi-trailer for operation of the brakes and pneumatic suspension system. The tractor provides electrical power for all lighting. It has a wheelbase of 126 in., tandem spacing of 52 in., a 47⁵/₈th wheel height, and a maximum weight of 35,080 lbs. Gross combined vehicle weight (GVW) and axle loads are contained in Table 3.5-1. Shoring will be required at the tandem for up and download operations on and off the aircraft. This is necessary for the fuel tank to clear the ramp crest angle of the aircraft and prevent damage. An explosive placard must be displayed on the bumper when transporting live motors.



QRLV125

Figure 3.5-1 Left and Right Profiles of a Figure A-101 Semi-Trailer



Figure 3.5-2 Figure A-101 Tractor & Semi-Trailer in Combination

<i>GVW</i>	<i>A-1</i>	<i>A-2</i>	<i>A-3</i>	<i>A-4</i>	<i>A-5</i>
45,452	4,738	9,948	9,948	10,409	10,409

Table 3.5-1 Axle Loads Figure A-101 and Tractor, Loaded with an M-56

4.0 CONTINGENCIES

4.1 Flight Operations

Kodiak airport will, on occasion, encounter fog conditions. This condition does allow departures but not landings. Runway 7-25 lands from the southeast to northwest. Winds can also present a problem. If the wind is too strong from the south and, depending on air speed, weight and breaking distance, an abort may be encountered.



Figure 4.1-1 Final Approach to Runway 7-25

This calculation is performed in the cockpit prior to entering the final approach pattern. Wind can also hamper a mission, as the aircraft visor cannot be opened or closed if winds reach or exceed 35 mph. If these situations do prevail, Elmendorf AFB, Anchorage will be used as the contingency landing field. The base is equipped with four hot pads.

The QD of the M-56 motor contained in the Figure A-101 is such that it would encroach on the use of two pads. To alleviate this encroachment for Elmendorf missions, it may be necessary to swiftly download the Figure A-101 from the aircraft and deliver to a designated area that can accommodate storage of explosives. The Figure A-101 will be placed in the C-5 with the tractor facing forward at the edge of the forward ramp. This will accommodate a quick download if the contingency is necessary. If a short layover is determined, Elmendorf can provide three 400 Btu portable heaters and monitor the Figure A-101 as required. This monitoring can be provided by missile handling personnel accompanying the shipment. Ensure an agreement is in place prior to the mission which will accommodate aircraft refueling, hot pad parking for the aircraft for at least 12 hours, explosive storage, and housing for aircrew and passengers.

4.2 EOD Response

EOD will respond IAW M-56 EOD Response Plan. The EOD will be provided by the 75th CEG/CED from Hill AFB, Ut. with alternate support from the 30th Space Wing Vandenberg AFB, Ca.

4.3 Turnoffs

In an event a vehicle becomes immobile or experiences problems, there are turnoff areas that can be utilized without impacting prevailing traffic on Pasagshak Road:

- Mileage Point (MP) 22.2 - 23.6 road width can accommodate pullover
- MP 27.0, located on left, a gravel area.
- MP 29.3, located on left, a rest area that can accommodate many vehicles.
- MP 30.6, located on right, compacted earth turnout area.
- MP 32.3, located on right, a compacted earth turnout area.
- MP 32.5, located on right, a gravel parking area.

All of these areas can support the Figure A-101 tractor and semi-trailer, the largest of the vehicles. From MP 32.5 to the site turnoff MP 36.1, there are no turnoff areas or shoulders. If an event occurs between these points, it will be necessary for personnel to remain and direct traffic around the vehicle until the situation is corrected.

4.4 February Delivery, Campaign

Delivery of the M-56 in a FIG-101 from the airport to KLC will have to exercise every caution. This operation will encounter two hurdles; hours of darkness operation and possible icy road conditions. The poor road condition and numerous up and down grades and switchbacks may require the use of a helper vehicle to navigate these conditions. The Brechan tractor an all-wheel vehicle could be used at the rear of the Fig-101 to prevent jack-knifing. A chain(s) attached between the tractor pintle hook and framework of the trailer and held taught by resistance may preclude this circumstance from occurring. A truck loaded with sand and shoring should also accompany the convoy. This material could be used to free the trailer or towing tractor if they became mired in a rut or stuck on ice. Additional flashlights should be made available to aid in recovery. Sunrise is predicted for 08:56 on 2/10/01 and 08:38 on 2/17/01, if a situation is encountered, and is deemed complicated or risky, it may be worth the wait for daylight before proceeding.

5.0 QRLV SHIPPING LIST (TBD)

ELEX PATHFINDER SHIPMENT

ITEM	ENVELOPE L x W x H	WEIGHT	SHIP ON PALLET	PALLET POSITION	MODE	SHIP DATE	RETURN DATE
Rail Set	240" x 83" x 66"	8,620				KLC	
Erector, Launch Plate & Umbilical	690" x 96" x 102"	53,300		FS 1,622	Air	10/7/00	
Navy 40' Lowboy Antenna Control	472" x 96" x 138"	28,000		FS 850	Air	10/7/00	
CTS Box	?	?			Air	10/7/00	
Nitrogen Bottles (10)	?	?		FS 1,826	Air	10/7/00	
Container #1	96" x 60" x 102"	1,800		FS 1,376	Air	10/7/00	10/26/00
Computer	33" x 27" x 33"	175					
Computer	33" x 27" x 33"	175					
Computer	33" x 27" x 33"	175					
Computer	33" x 27" x 33"	175					
Monitor	33" x 27" x 28"	175					
Monitor	33" x 27" x 28"	175					
Monitor	33" x 27" x 28"	175					
Monitor	33" x 27" x 28"	175					
Tool Box	18" x 35" x 50"	1,000					
Dupe		520					
		4,720 Total					
Container #2	96" x 60" x 102"	1,800		FS 1,488	Air	10/7/00	10/26/00
Cables	42" x 42" x 42"	500					
Misc.	42" x 42" x 42"	500					
DAS	31" x 29" x 56"	400					
1021-3164	36" x 25" x 24"	300					
1021-3165	36" x 25" x 24"	300					
Dupe		480					
		4,280 Total					
Container #3	96" x 60" x 102"	1,800		FS 1,668	Air	10/7/00	10/26/00
Tower PC	36" x 34" x 26"	200					
Tower PC	36" x 34" x 26"	200					
Misc.	31" x 29" x 56"	400					
GPS	31" x 29" x 56"	400					
Dupe		400					
		3,400 Total					
Container #4	96" x 60" x 102"	1,800		FS 1,646	Air	10/7/00	10/26/00
FTSM & Lug Wafer	50" x 52" x 54"	500					
DCOM	31" x 29" x 56"	400					
1021-3166	36" x 25" x 24"	300					
Dupe		400					
		3,400 Total					
Container #5	96" x 60" x 102"	1,800		FS 1,738	Air	10/7/00	10/26/00
PMB	44" x 85" x 48"	1,400					
1023-3364	34" x 27" x 28"	400					
Dupe		460					
		4,060 Total					
Pax (12)		2,400			Air	10/7/00	
ELEX PATH RETURN							
Container #1	96" x 60" x 102"	3,310		FS 330	Air	10/26/00	
Container #2	96" x 60" x 102"	3,127		FS 420	Air	10/26/00	
Container #3	96" x 60" x 102"	2,653		FS 510	Air	10/26/00	
Container #4	96" x 60" x 102"	3,978		FS 600	Air	10/26/00	
Container #5	96" x 60" x 102"	2,841		FS 690	Air	10/26/00	
Pax (0)		0					
ITEM	ENVELOPE L x W x H	WEIGHT	SHIP ON PALLET	PALLET POSITION	MODE	SHIP DATE	RETURN DATE

CAMPAIGN SHIPMENT							
Fig A-101 W/M-56 A-1	420" x 96" x 144"	30,452			Air	2/17/01	
Tractor Volvo White	240" x 96" x 144"	23,340			Air	2/17/01	
Navy Trailer Comm.	540" x 96" x 156"	40,000			Sea	10/19/00	
Payload	Classified				Air	2/17/01	
Contraves Camera w/cover	184"x 81"x 119"	10,280			Air	2/17/01	
IFLOT Camera	131" x 84" x 74"	3,470			Air	2/17/01	
Flight Termination Control	80" x 80" x 69"	2,000			Air	2/17/01	
EOD Vehicle	259" x 80" x 88"	6,840			Air	2/17/01	
6 Elex Racks on 463L Pallet	88" x 108" x 72"	1,200			Air	2/17/01	
Mobile Mini Container 1	96" x 120" x 102"	7,980			Air	2/17/01	
Mobile Mini Container 2	96" x 120" x 102"	7,580			Air	2/17/01	
Mobile Mini Container 3	96" x 120" x 102"	7,630			Air	2/17/01	
Mobile Mini Container 4	96" x 120" x 102"	6,830			Air	2/17/01	
Mobile Mini Container 5	96" x 120" x 102"	8,330			Air	2/17/01	
Pax (?)					Air	2/17/01	

6.0 LOGISTICS SUPPORT

The goal of the logistics support system program is to ensure the delivery of a supportable motor stack shipping and handling system while minimizing life cycle cost. Impact on existing support resources will be identified. The system will be fully integrated into existing OO-ALC operations.

6.1 Spares

All GSE can be supported through the existing Air Force Supply System unless contractor logistics support (CLS) becomes a requirement as a result of cost trades performed as a function of the life cycle cost analysis.

6.2 Support Equipment (TBD)

6.3 Personnel Requirements

The following Air Force Specialties support motor stack shipping and transportation:

(AFSC) 3E8X1	Explosive Ordnance Disposal Specialist
	Vehicle Operator
	Transportation and Handling Operator
	Special Purpose Vehicle Mechanic

7.0 APPROVALS AND CERTIFICATES

For all modes of transportation, certificates of equivalency (COE) shall be prepared and submitted, as well as all necessary state highway permits. No shipment shall take place without the prior approval of all appropriate regulatory bodies. Existing certificates and approvals for the Minuteman hardware shall be utilized to the maximum extent practical.

8.0 ENVIRONMENTAL COMPLIANCE

- EAs are required to support all rocket motor shipments
- All shipment of rocket motors constitutes a Federal action
- Every Federal action requires NEPA documentation (from CATEX to EIS)
- EAs should be complete and FONSI signed prior to shipments

9.0 ABBREVIATIONS AND ACRONYMS

AADC	Alaska Aerospace Development Corporation
AF	Air Force
AFI	Air Force Instruction
AFJM	Air Force Joint Manual
AFSC	Air Force Specialty Codes
ALC	Air Logistics Center
AMC	Air Mobility Command
AWOC	Alaska Weather Operations Center
AODS	All Ordnance Destruct System
CATX	Categorical Exclusion
C/D	Class/Division
CFR	Code of Federal Regulation
COE	Certificate of Equivalency
DoD	Department of Defense
DoT	Department of Transportation
DSN	Defense Switched Network
EA	Environmental Assessment
ECS	Environmental Control System
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
ERP	Emergency Response Plan
ERTC	Emergency Response Team Chief
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
FTS	Flight Termination System
GBL	Government Bill of Lading
GSE	Ground Support Equipment
GVW	Gross Vehicle Weight
HAFB	Hill Air Force Base
HAZ MAT	Hazardous Material
HDBK	Handbook
HP	Horse Power
IAW	In accordance with
IB	Inhabited Building
IPF	Integrated Process Facility
ISO	International Standards Organization
KLC	Kodiak Launch Complex
LGM-30	Minuteman Weapon System
LM	Silo Based ICBM System Program Office
LMS	LM Safety Office
LMSS	Missile Maintenance Support Branch
MIL	Military

MM	Minuteman
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
nm	Nautical Miles
OSC	On Scene Commander
PAX	Passengers
QD	Quantity Distance
QRLV	Quick Reaction Launch Vehicle
RON	Remain Overnight
SAAM	Special Assignment Airlift Mission
STD	Standard
TACC	Tanker/Airlift Control Center
TO	Technical Order

10.0 ATTACHMENTS

- COEs
- Air Certifications